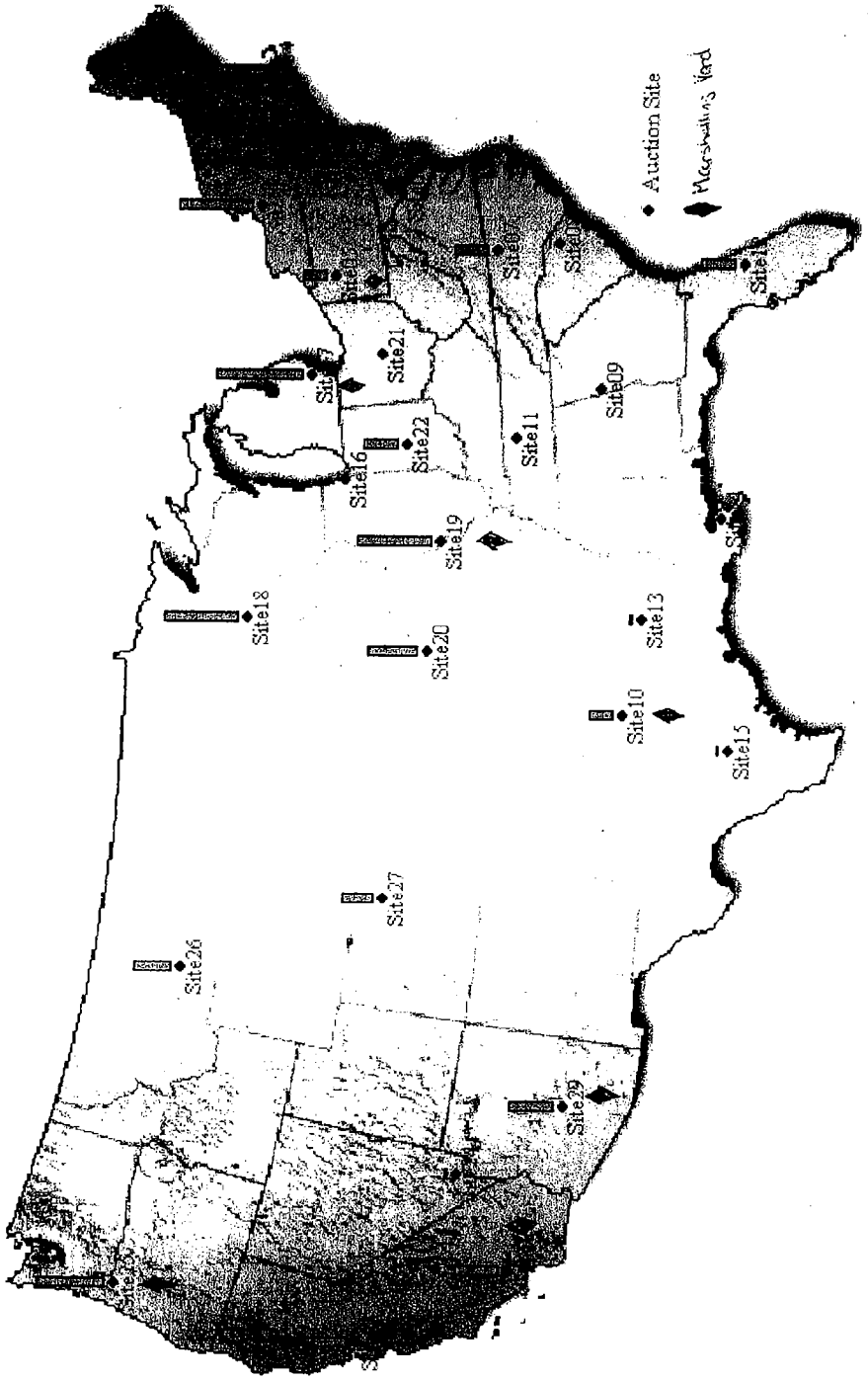
Auction Site
Site01
Site09
Site10
Site11
Site13
Site15
Site16
Site18
Site19
Site20
Site21
Site22
Site26
Site27
Site29

FIG. 1

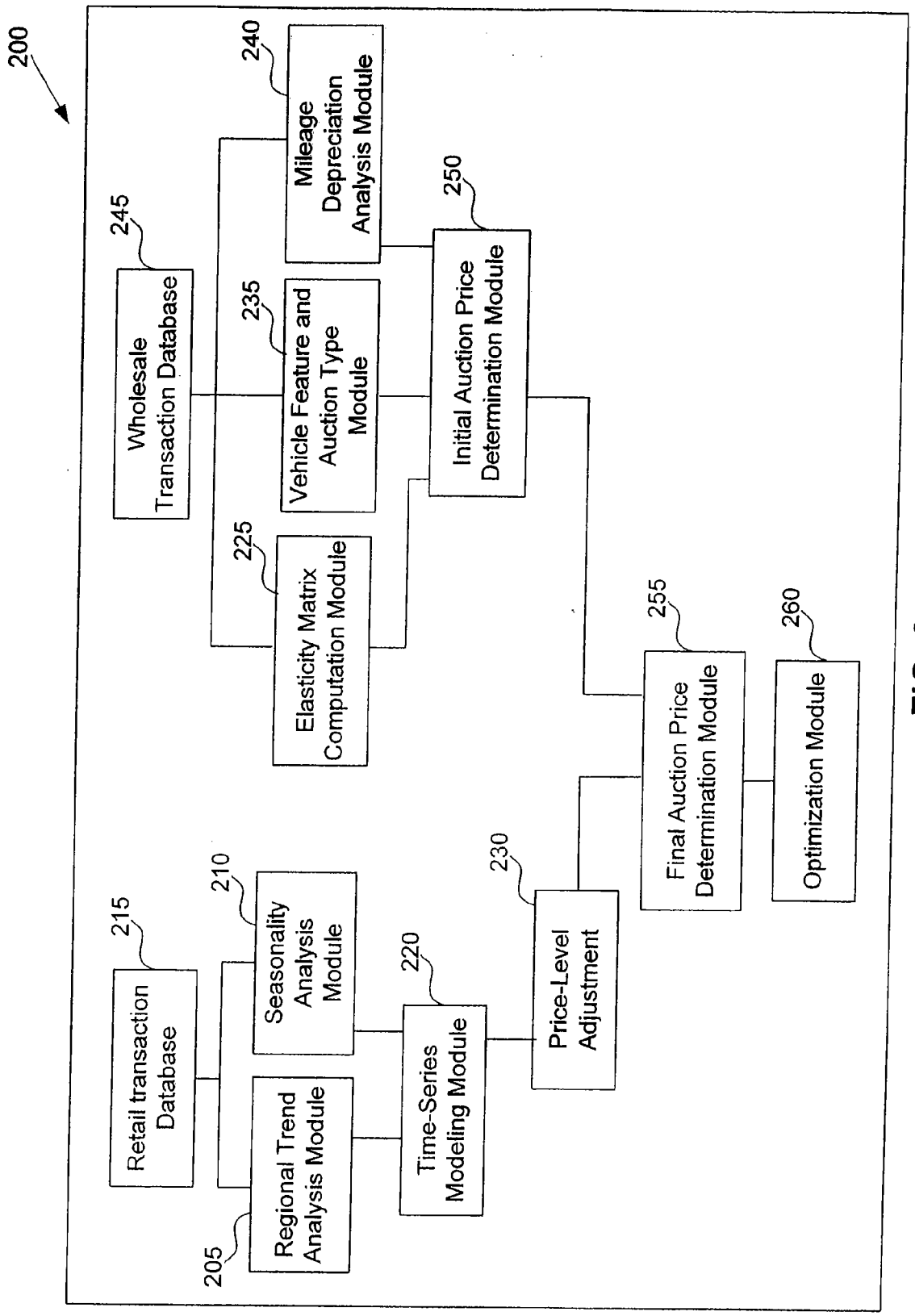
200
240
Mileage Depreciation Analysis Module
245
Wholesale Transaction Database
235
Vehicle Feature and Auction Type Module
250
Initial Auction Price Determination Module
225
Elasticity Matrix Computation Module
255
Final Auction Price Determination Module
260
Optimization Module
210
Seasonality Analysis Module
215
Retail transaction Database
220
Time-Series Modeling Module
230
Price-Level Adjustment
205
Regional Trend Analysis Module

FIG. 2

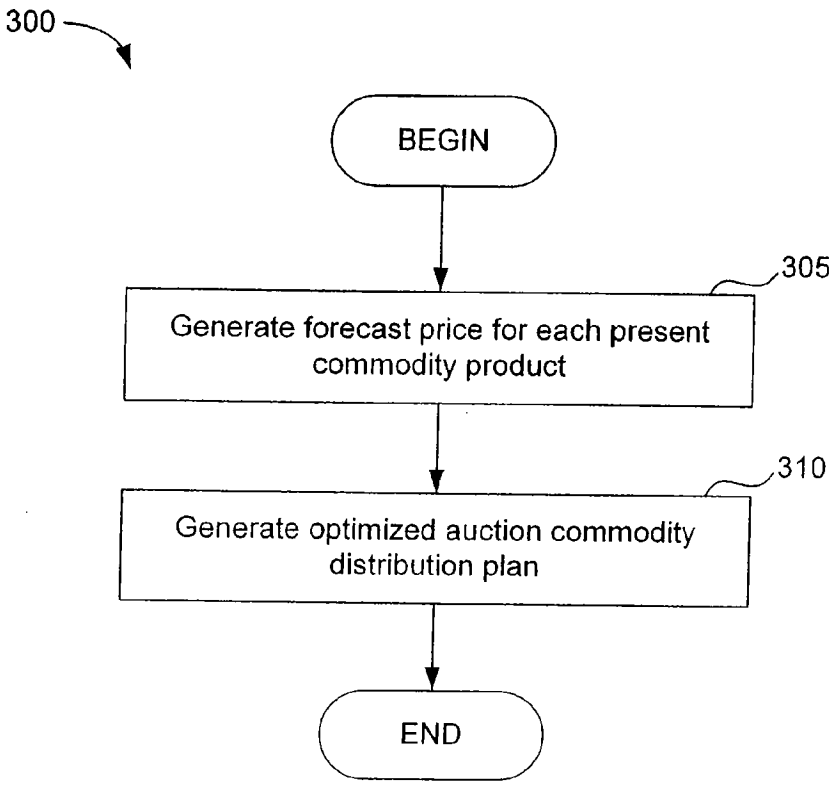
300
BEGIN
305
Generate forecast price for each present commodity product
310
Generate optimized auction commodity distribution plan
END

FIG. 3

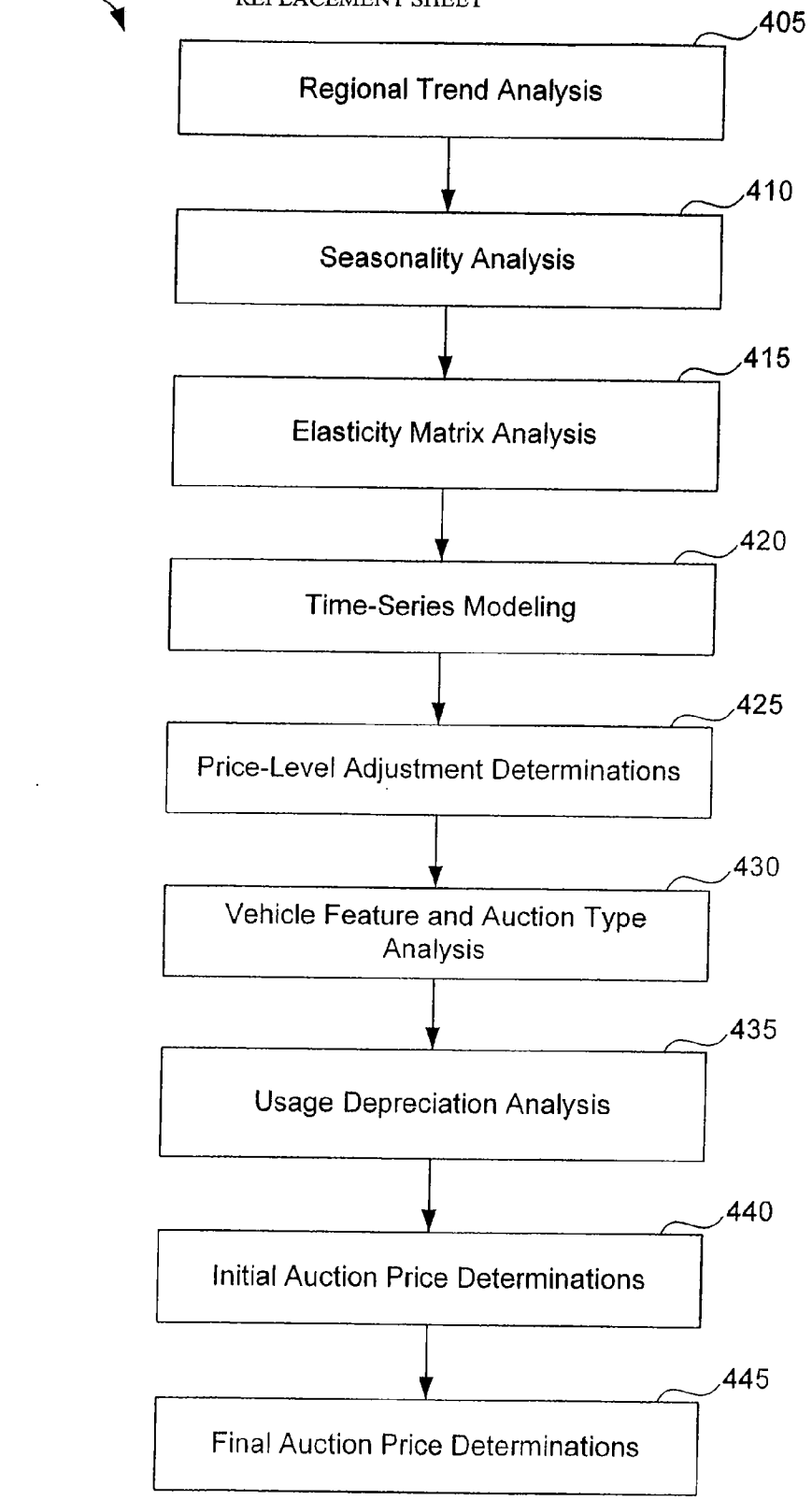
400
405
Regional Trend Analysis
410
Seasonality Analysis
415
Elasticity Matrix Analysis
420
Time-Series Modeling
425
Price-Level Adjustment Determinations
430
Vehicle Feature and Auction Type Analysis
435
Usage Depreciation Analysis
440
Initial Auction Price Determinations
445
Final Auction Price Determinations

FIG. 4

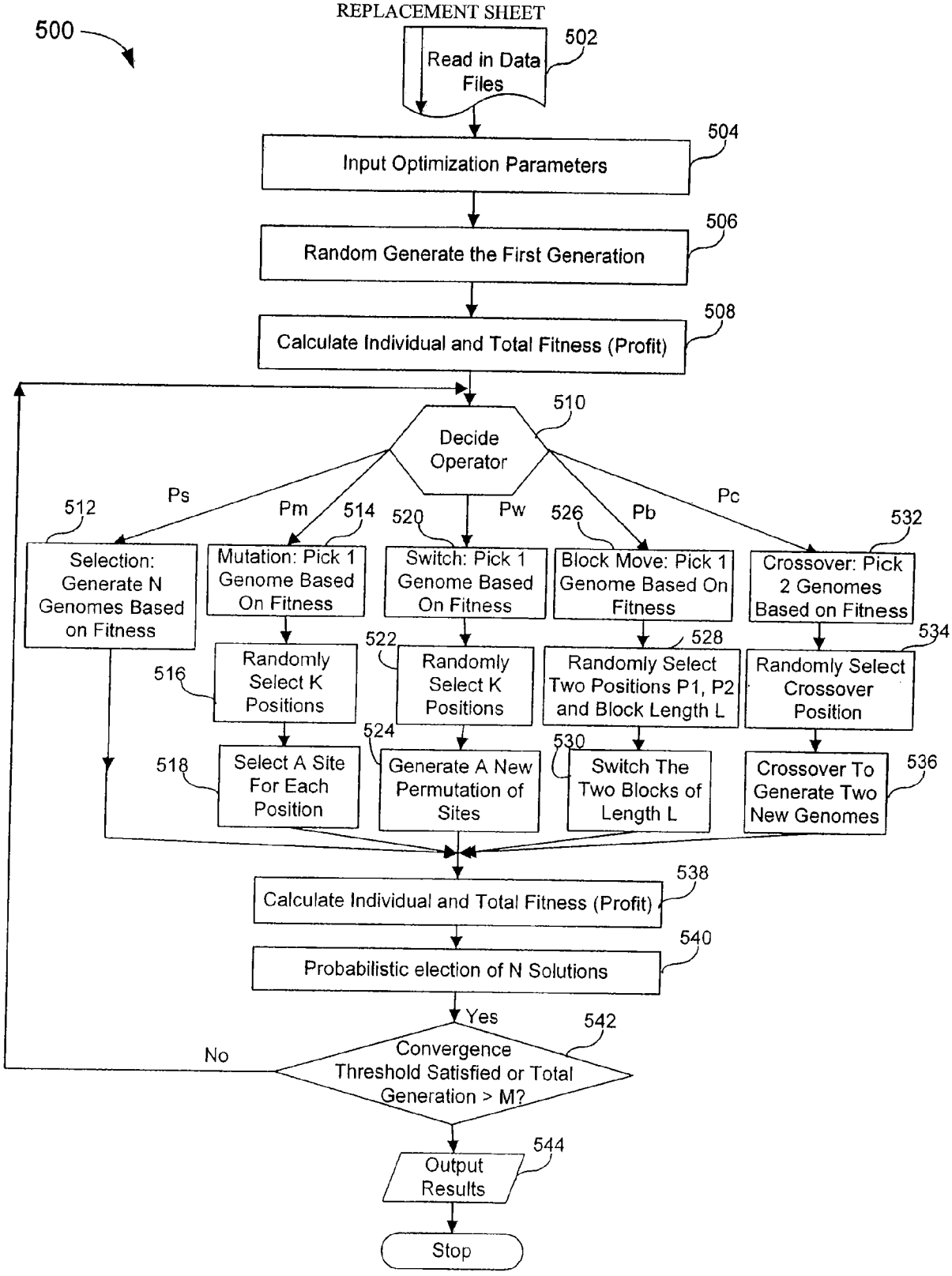
500
Read in Data Files
502
Input Optimization Parameters
504
Random Generate the First Generation
506
Calculate Individual and Total Fitness (Profit)
508
Decide Operator
510
Ps
Pm
Pw
Pb
Pc
512
Selection: Generate N Genomes Based on Fitness
514
Mutation: Pick 1 Genome Based On Fitness
520
Switch: Pick 1 Genome Based On Fitness
526
Block Move: Pick 1 Genome Based On Fitness
532
Crossover: Pick 2 Genomes Based on Fitness
516
Randomly Select K Positions
522
Randomly Select K Positions
528
Randomly Select Two Positions P1, P2 and Block Length L
534
Randomly Select Crossover Position
518
Select A Site For Each Position
524
Generate A New Permutation of Sites
530
Switch The Two Blocks of Length L
536
Crossover To Generate Two New Genomes
538
Calculate Individual and Total Fitness (Profit)
540
Probabilistic election of N Solutions
Yes
542
No
Convergence Threshold Satisfied or Total Generation > M?
544
Output Results
Stop

FIG. 5

Genetic Operators

- Selection
  - Randomly generates a new generation based on the fitness of the their parents

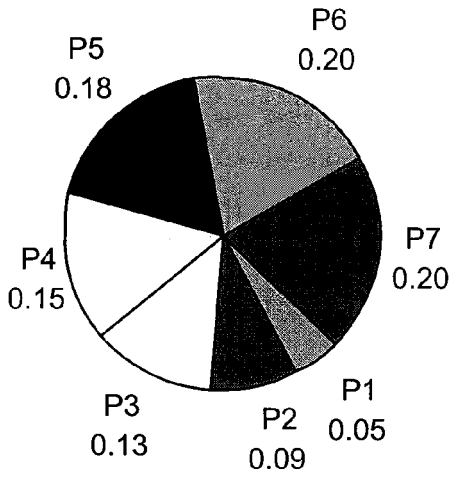

FIG. 6

Genetic Operators

- Mutation
  - Randomly selects N_m genes from a genome
  - Randomly assigns new auction sites to the N_m genes

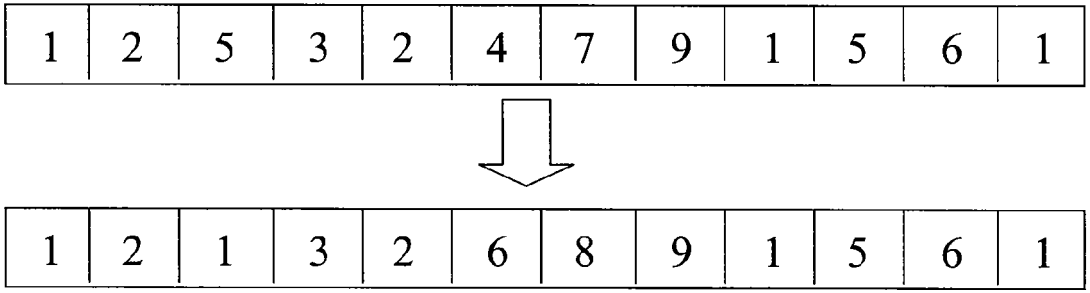

FIG. 7

Genetic Operators

- Switch
  - Randomly selects N_s genes from a genome
  - Randomly generates permutation of their auction sites

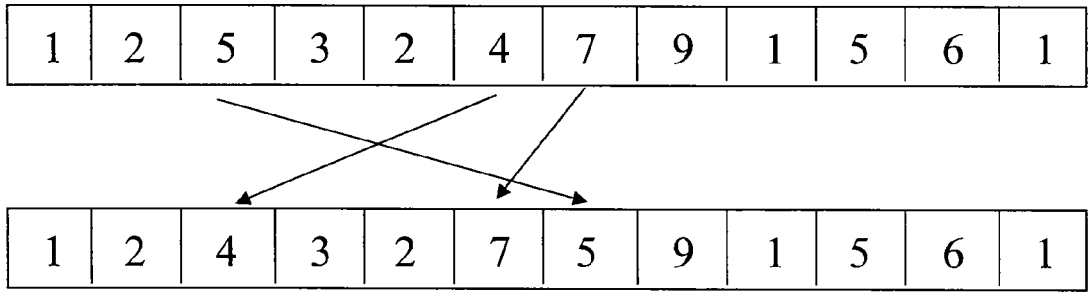

FIG. 8

Genetic Operators

- Block Move
  - Randomly selects two positions p_1 and p_2 in a genome
  - switch two blocks starting at p_1 and p_2 with length of N_b

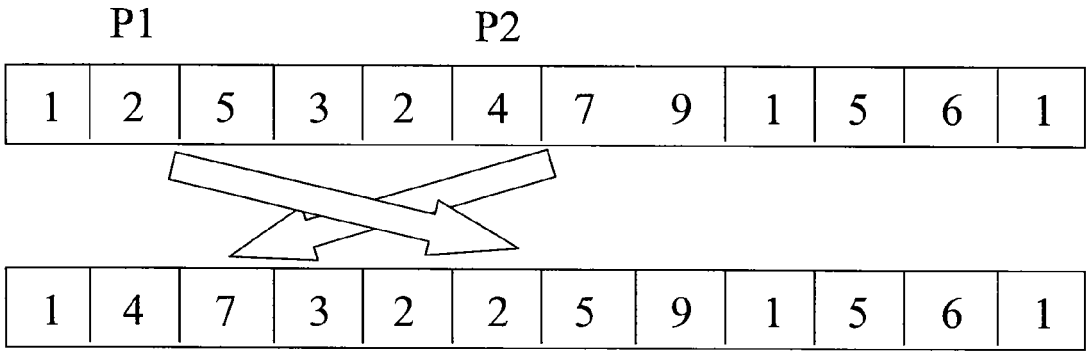

FIG. 9

Genetic Operators

- Crossover
  - Randomly selects 2 genomes based on their fitness
  - Randomly selects a position in a genome and crossover the 2 genomes to form two new genomes

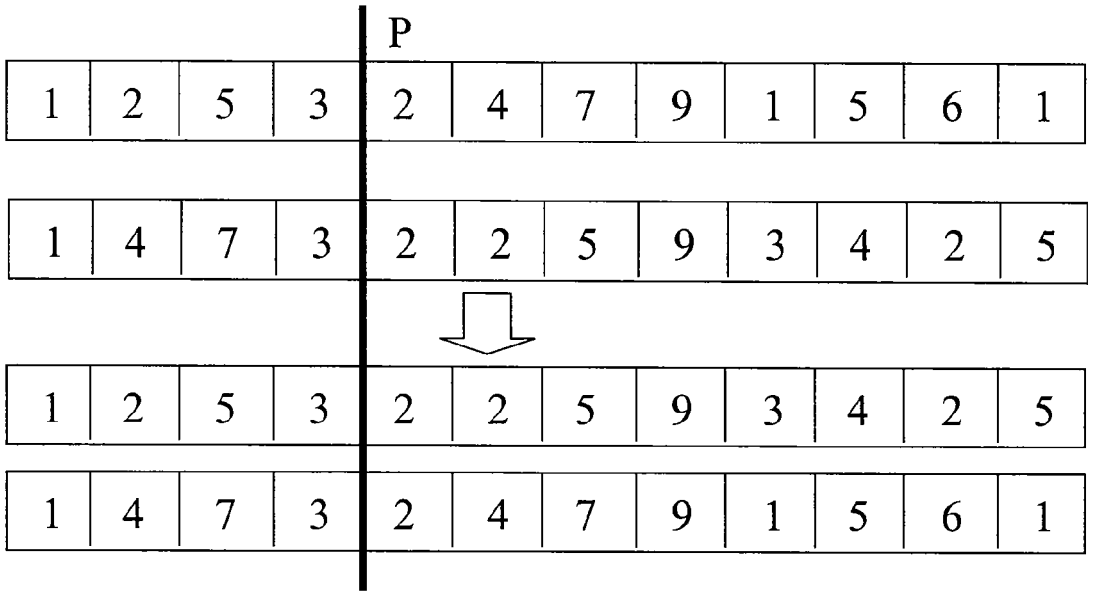

FIG. 10

Original Auction Vehicle Distribution Plan

	500	501	503	506	508	509	529	530	532	533	535	537	538	539	540	550	553	554	556	557	558	561	586	590	593	594	595	597	598
VR101		33	8	5				25														2							
VR104					13			7				8				1		2				5							
VR107												1						23				1				112		82	
VR108							1						13					3	11	1			38			24			
VR110									1																				
VR112										18																			
VR113							58	1																					
VR114																													42
VR115																									23				
VR116																		2									15		
VR117			59																										
VR118					16																								
VR119											25																		
VR120																													
VR121																9													
VR122																		52											
VR123																			6										
VR124		8										17	6						27	153									
VR125													1											50					
VR126																										23			
VR130				93																									
VR131																													
VR132													10																
VR133																						4							
VR134																	54												
VR135	5																												
VR136						13																							

FIG. 11

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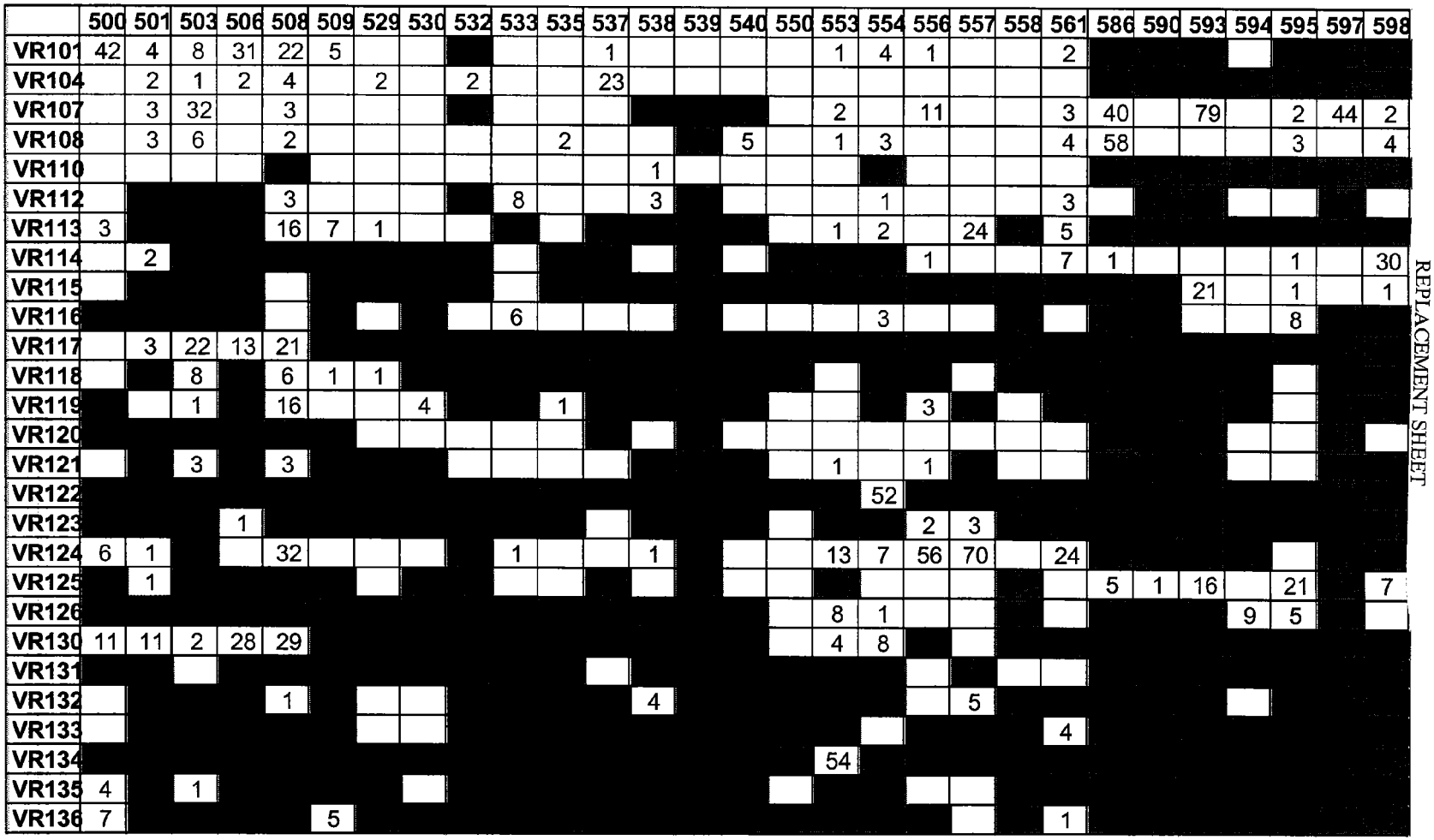
REPLACEMENT SHEET

Optimized Auction Vehicle Distribution Plan



	500	501	503	506	508	509	529	530	532	533	535	537	538	539	540	550	553	554	556	557	558	561	586	590	593	594	595	597	598
VR101	42	4	8	31	22	5						1					1	4	1			2							
VR104		2	1	2	4		2		2			23																	
VR107		3	32		3												2		11			3	40		79		2	44	2
VR108		3	6		2						2				5		1	3				4	58				3		4
VR110													1																
VR112					3					8			3					1				3							
VR113	3				16	7	1										1	2		24		5							
VR114		2																	1			7	1				1		30
VR115																									21		1		1
VR116										6								3									8		
VR117		3	22	13	21																								
VR118			8		6	1	1																						
VR119			1		16			4			1								3										
VR120																													
VR121			3		3												1		1										
VR122																		52											
VR123				1															2	3									
VR124	6	1			32					1			1				13	7	56	70		24							
VR125		1																					5	1	16		21		7
VR126																	8	1								9	5		
VR130	11	11	2	28	29												4	8											
VR131																													
VR132					1								4							5									
VR133																						4							
VR134																	54												
VR135	4		1																										
VR136	7					5																1							

FIG. 12

Optimal vs. Original Distribution Plans

	Original ($)	*Optimal ($)*	*Change ($)*
Profit	19,291,821	19,599,321	307,500
Auction Revenue	19,557,169	20,145,360	588,191
Shipping Cost	(131,947)	(381,808)	(249,861)
Time Value Cost	(25,158)	(35,314)	(10,156)
Volume Elasticity Cost	(59,230)	(53,770)	5,460
Shipping Waste Cost	(49,013)	(75,147)	(26,134)

FIG. 13

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Sheet 13 of 18
REPLACEMENT SHEET

Results

Summary | Shipping | Inventory | Source | Price |

Select

Vehicle Model Year: All

Vehicle Model: All

Package: All

Auction Site: Site22 (IN)

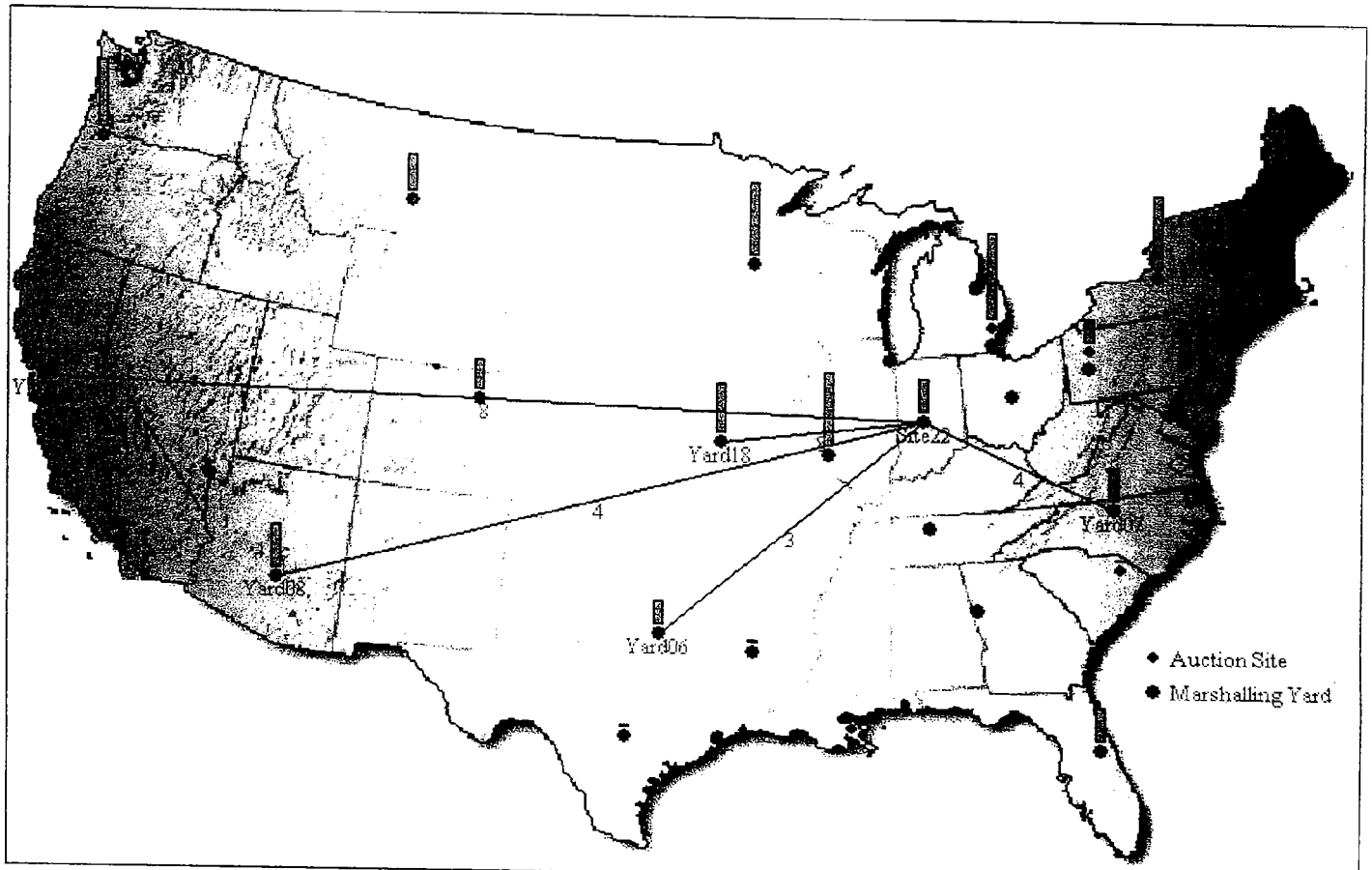
Display

Save Results

File Directory: C:\Projects\ODAV_DISTRIBUTI

File Name:

Save



Site Name	Veh. No.	Sale Price ($)	Ship. T (d)	Ship. Cost ($)	T to Auc (d)	Time Cost ($)	Elas Cost ($)	Ship Multi Cost ($)	Profit ($)	Auc. D
Yard03 (CA)	8	10,573	2.7	5,360	3	240	0	0.00	78,991	1/2/2(
Yard06 (TX)	3	20,072	2.5	1,098	3	90	0	1830.00	57,198	1/2/2(
Yard07 (NC)	4	12,446	1.2	764	3	120	0	764.00	48,138	1/2/2(
Yard08 (AZ)	4	20,072	1.0	2,440	3	120	0	2440.00	75,288	1/2/2(
Yard18 (MO)	8	15,160	0.6	1,560	3	240	0	0.00	119,482	1/2/2(

OK | Cancel | Apply | Help

FIG. 14

Results

Summary | Shipping | Inventory | Source | Price

Select

Vehicle Model Year: All

Vehicle Model: All

Package: All

Marshalling Yard: Yard03 (CA)

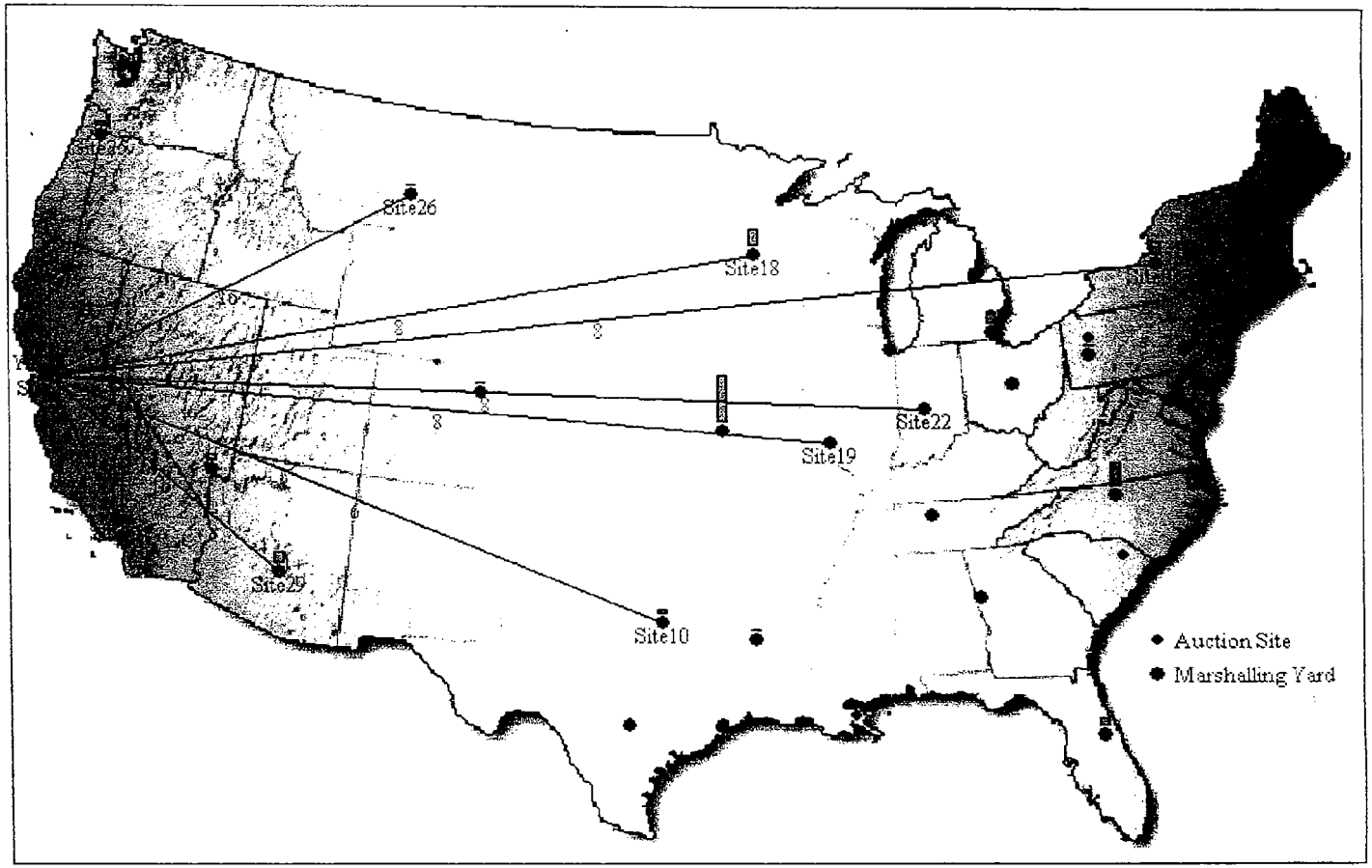
Display

Save Results

File Directory: C:\Projects\CDAV_DISTRIBUTI

File Name:

Save



Site Name	Veh. No.	Sale Price ($)	Ship. T (d)	Ship. Cost ($)	T to Auc (d)	Time Cost ($)	Elas Cost ($)	Ship Multi Cost ($)	Profit ($)	Auc
Site03 (NY)	8	20,381	17.2	6,384	30	2,400	670	0	153,598	1/2
Site10 (TX)	6	11,086	8.8	3,240	17	1,020	0	1,080	61,180	1/1
Site18 (MN)	8	17,264	3.7	4,752	16	1,280	345	0	131,735	1/1
Site19 (MO)	8	14,606	2.7	4,600	4	320	880	0	111,048	1/3
Site22 (IN)	8	10,573	2.7	5,360	3	240	0	0	78,991	1/2
Site23 (CA)	24	16,585	1.1	3,984	2	480	0	0	393,578	1/1

FIG. 15

OK | Cancel | Help

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Sheet 15 of 18
REPLACEMENT SHEET

Results

Summary | Shipping | Inventory | Source | Price |

Select

Vehicle Model Year: 2001

Vehicle Model: SUV 4WD

Package: All

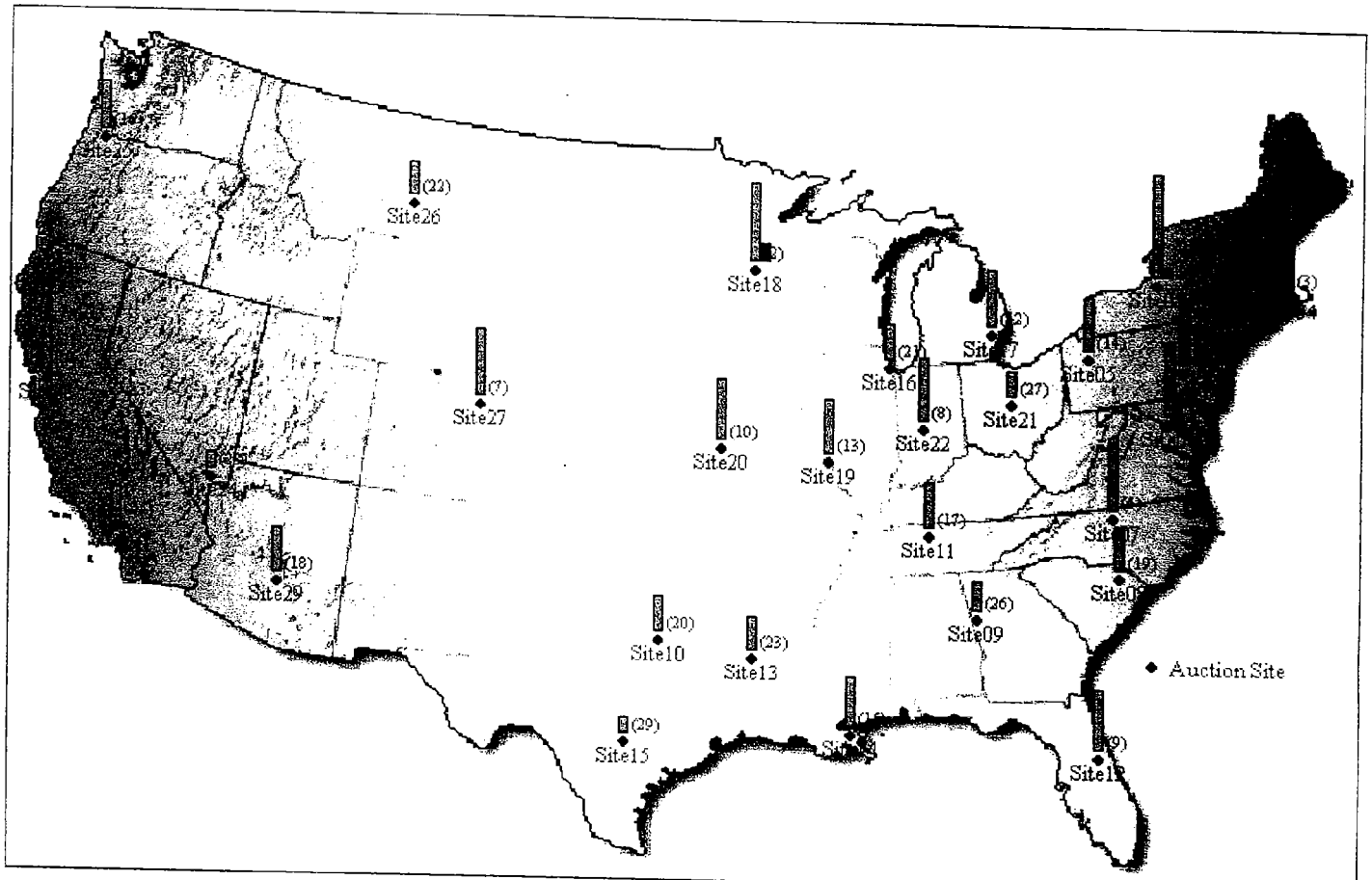
Display

Save Results

File Directory: C:\Projects\ODAV_DISTRIBUTI

File Name:

Save



Label	Name	City	State	Zip	Price ($)	Elas. Cost ($)	Rank
Site01	Hatfield	Hatfield	PA	19440	20,097	0	6
Site02	Southern	E. Windsor Hill	CT	06088	19,961	0	11
Site03	Tri-State	Syracuse	NY	13039	20,656	65	1
Site04	America	North Dighton	MA	02764-0...	20,385	0	3
Site05	Butler	Ogle	PA	16066	19,862	0	14
Site06	Fredericks	Fredericks	VA	22402	20,197	0	5
Site07	Greensboro	Greensboro	NC	27407	20,205	0	4

OK | Cancel | Help

FIG. 16

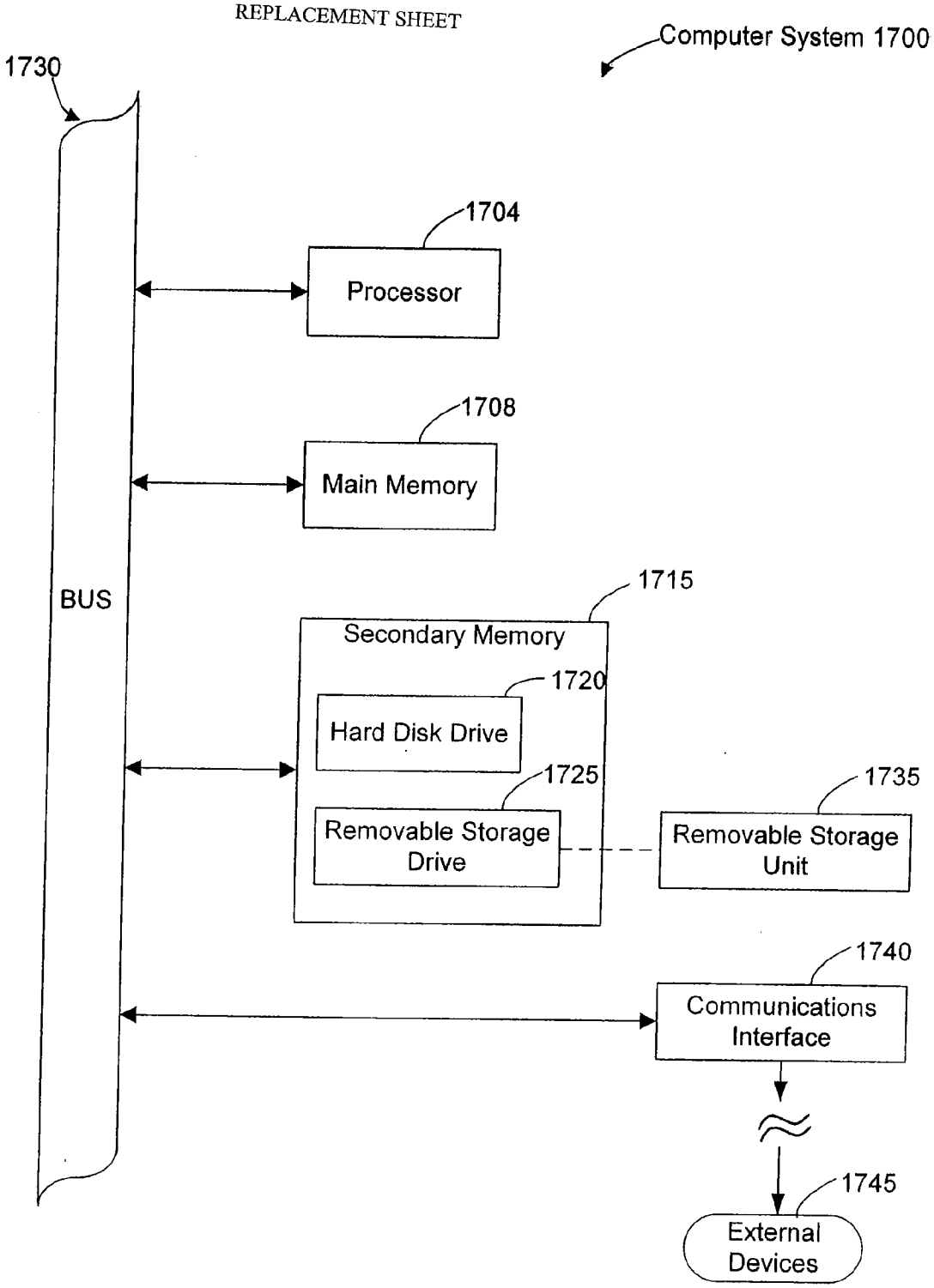

Computer System 1700
1730
1704
Processor
1708
Main Memory
BUS
1715
Secondary Memory
1720
Hard Disk Drive
1725
Removable Storage Drive
1735
Removable Storage Unit
1740
Communications Interface
1745
External Devices

FIG. 17

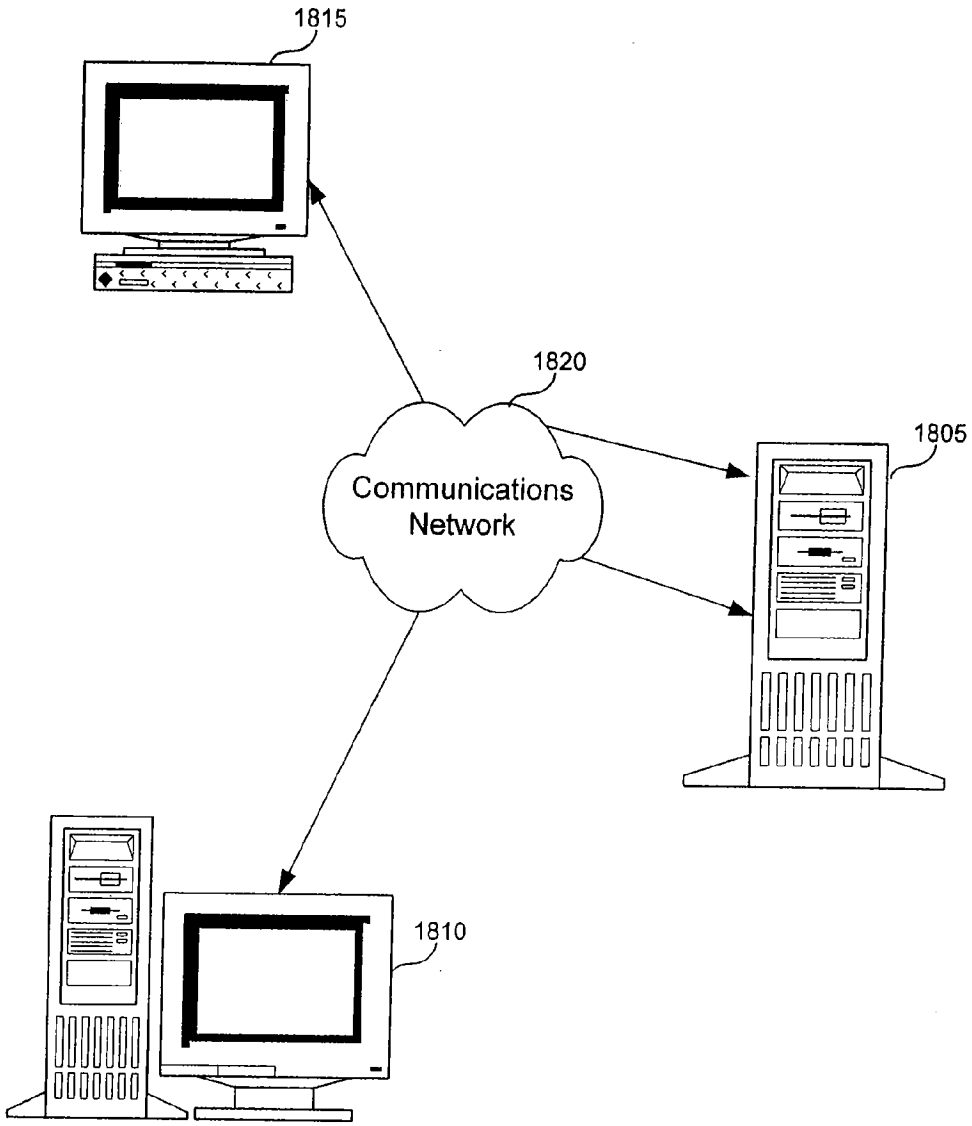


FIG. 18